Do Outcomes of a School Based Intervention to Improve Cardiovascular Health vary by Gender, Race, Socioeconomic Status or Residential Setting?

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Background

- CVD risk factors present in childhood
- Environmental factors reinforce sedentary behaviors and poor eating habits
- Outcomes increasingly prevalent in children
  - Obesity
  - Hypercholesterolemia
  - Type 2 Diabetes

Significance

- Lifestyle habits and preferences begin in childhood
- CVD risk factors continue through life
- Behaviors more difficult to change as adults
  - Important to Target and Direct Interventions toward Children

Improving Children's Health with Prevention Programs

- Population Level Interventions
- School-based Interventions
  - Efficient use of resources
  - Potential influence at different levels
  - Personal, family, peer, system, social
  - Promotes policy changes

Problems

- Disappointing outcomes
- No consensus on:
  - best approach to use
  - most significant variable to target
- No knowledge of:
  - Who is most influenced by intervention
  - Process of change for the intervention

Identifying Mediators and Moderators of Intervention Effects

- Help Design, Explain, and Understand
- Provide the How, Why and When
- Have not been identified in school-based interventions to decrease CVD

Mediators

- Provide a causal link
- Explain the process
- Represent intermediate outcomes

Moderators

- Distinguish between differences of subgroups or subject characteristics
- Defined in terms of interactions
- Describe who responds best

Purpose

Examine Moderators
of the intervention effects of the
Cardiovascular Health In Children I study
(CHIC 1)
a school-based intervention designed to
improve CV health in elementary students
in North Carolina

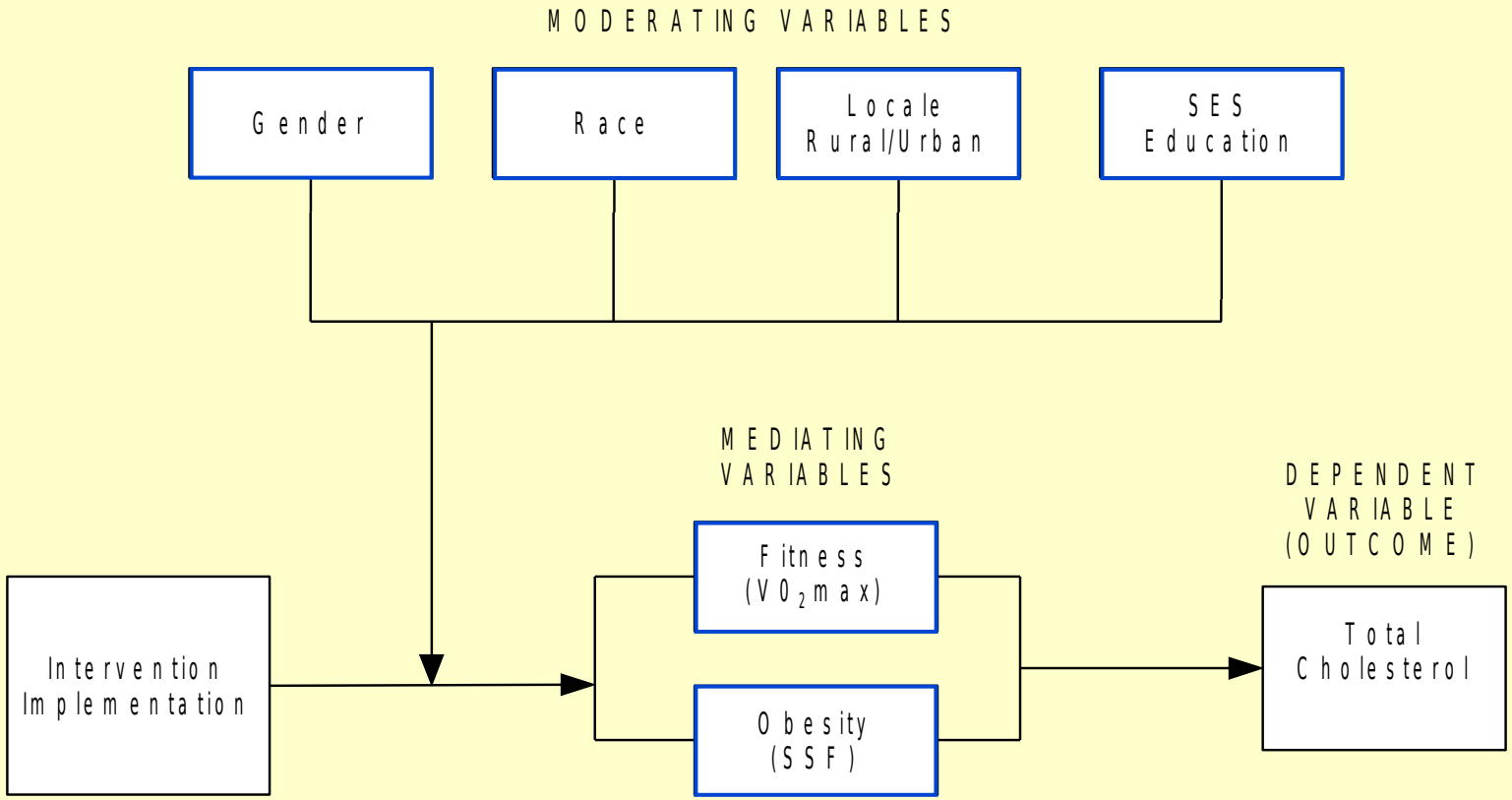
Potential Moderators

- **Personal characteristic variables**
  Gender and Race
- **Family characteristic variable**
  Socioeconomic Status (SES)
- **Physical environmental variable**
  Geographic Location (Rural or Urban).

Potential Mediators

- **Increase in fitness level** - measured by estimated maximal oxygen uptake → $V0_2max$
- **Decrease in obesity** - measured by sum of skinfolds → SSF

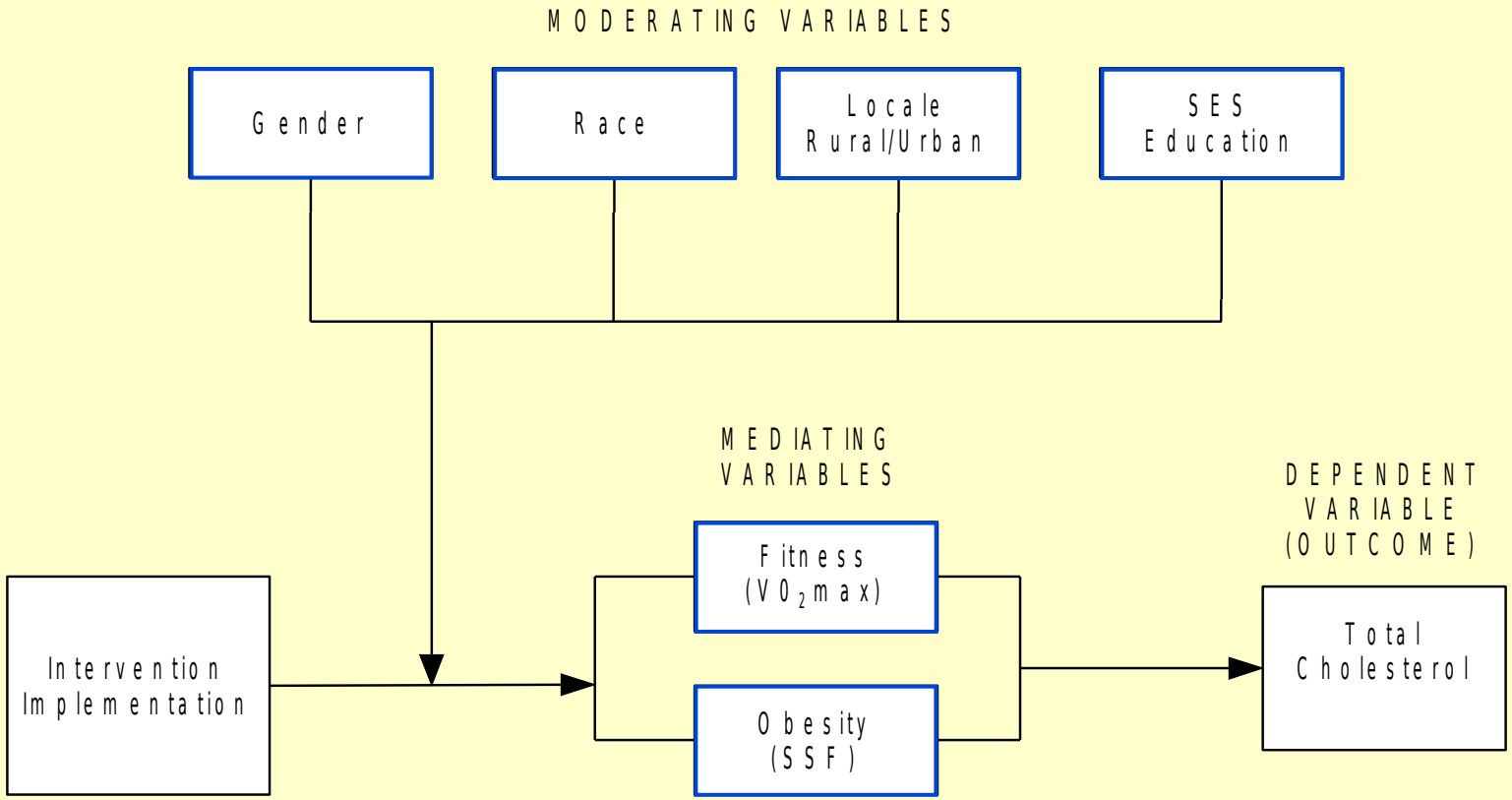
Conceptual Model



Research Question #1

Do Gender, Race, SES, and Geographic Location alone and/or in interaction with the Intervention function as Moderators in explaining intervention effects on the Mediators of Increase in Fitness ($V0_2max$) and Decrease in Obesity (SSF) to influence TC?

Conceptual Model

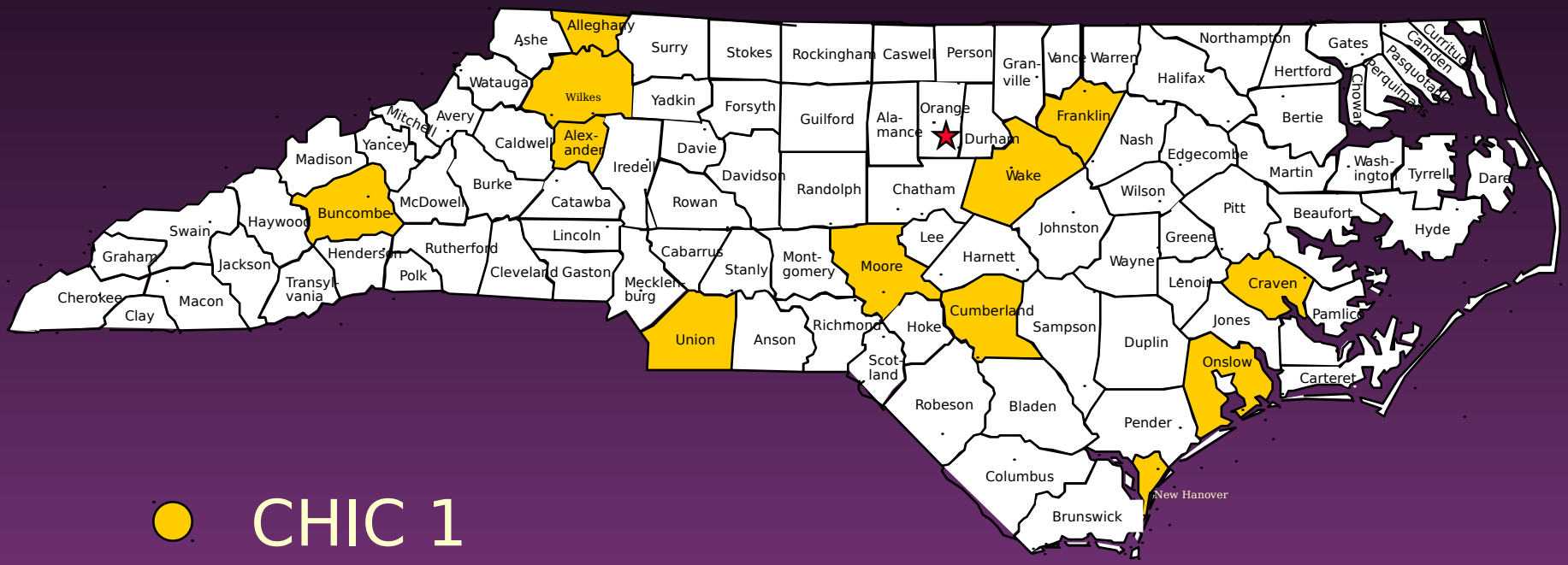


The CHIC 1 Study

- Longitudinal descriptive & intervention study
- Across the state of North Carolina
- 3 geographic regions
- Rural and urban schools
- 18 elementary schools
- 3rd and 4th graders

NINR, NIH #1-R01-NR01837-01

North Carolina Counties Participating in the **C**ardiovascular **H**ealth **I**n **C**hildren Study



- CHIC 1
- ★ UNC at Chapel Hill

The CHIC 1 Intervention

- 2 Different Interventions
- Population level
  - Classroom-based
  - Physical Activity component
    Designed for fun aerobic exercise
  - Knowledge component
    AHA school-site kits

NINR, NIH #1-R01-NR01837-01

Methods

- Secondary Data Analysis
- One year post intervention effects
- Setting
  - Across the state of North Carolina
  - 3 geographic regions
  - Rural and urban schools
  - **12** elementary schools
  - 3rd and 4th graders

Sample Reduction

CHIC 1 (N =1338)

N = 353

o data available at 1-yr measurement for

- Cholesterol (N = 241)
- Other race category (N = 55)
- Missing f/u mediating variables (N = 17)
- Missing mother's education (N = 40)

Final Study Sample (N = 985)

Sample Characteristics

Mean Age = 8.87

3rd graders (N = 498) 4th graders (N = 487)

Girls 51.27% (N = 505) Boys 48.73% (N = 480)

Rural 51.37% (N = 506) Urban 48.63% (N = 479)

Caucasian 79.29% African American 20.71%

Mother's Education Level

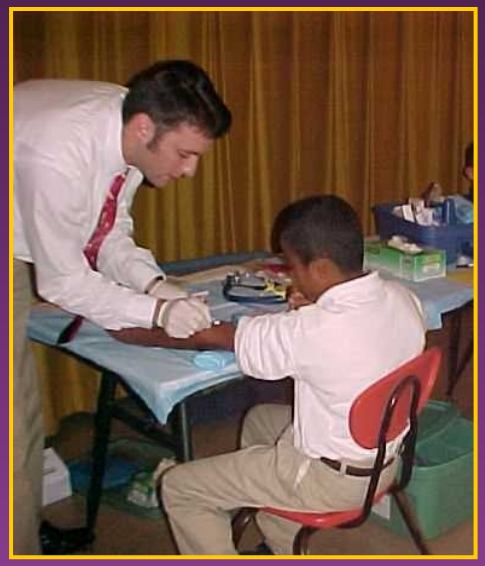
13% < HS

31% HS grad

31% some college

25% college grad or more

Methods



Variables and Their Measurement (1 of 6)

- Independent Variables
  - Dichotomous categorical variables were dummy coded
    - Gender → girls = 0 boys = 1
    - Race → African American = 0 Caucasian = 1
    - Location → Rural = 0 Urban = 1
    - Intervention → Control = 0 Intervention = 1

Variables and Their Measurement (2 of 6)

- SES – Mother's Education
  - Logical
  - More Data available
  - More single mothers as head of household
  - 4 Levels
    - < HS
    - HS Graduate
    - Some college education
    - College graduate or >
  - Centered

Variables and Their Measurement (3 of 6)

Rural

Schools located in a county with no cities of 50,000 and in a town with < 25,000

Urban

Schools located in a city with > 50,000
Standard Metropolitan Statistical Areas (SMSA)

Variables and Their Measurement (4 of 6)

- Mediating Variable of Cardiorespiratory Fitness
  - Estimated maximal O_2 uptake.
  - Maximum aerobic power (pVO_2max) predicts maximum O_2 uptake based on maximal heart rate
  - Eurofit submaximal cycle ergometry test

Variables and Their Measurement (5 of 6)

- Mediating Variable of Sum of Skinfolds
  - Lange skinfold calipers
  - Measures triceps and subscapular skinfolds
  - The R sided skinfold sites located & measured twice
  - Scores summed & mean measures for each site used to determine SSF
  - IAW National Health and Nutrition Examination Survey procedures
  - SSF skewed distribution - log transformation

Variables and Their Measurement (6 of 6)

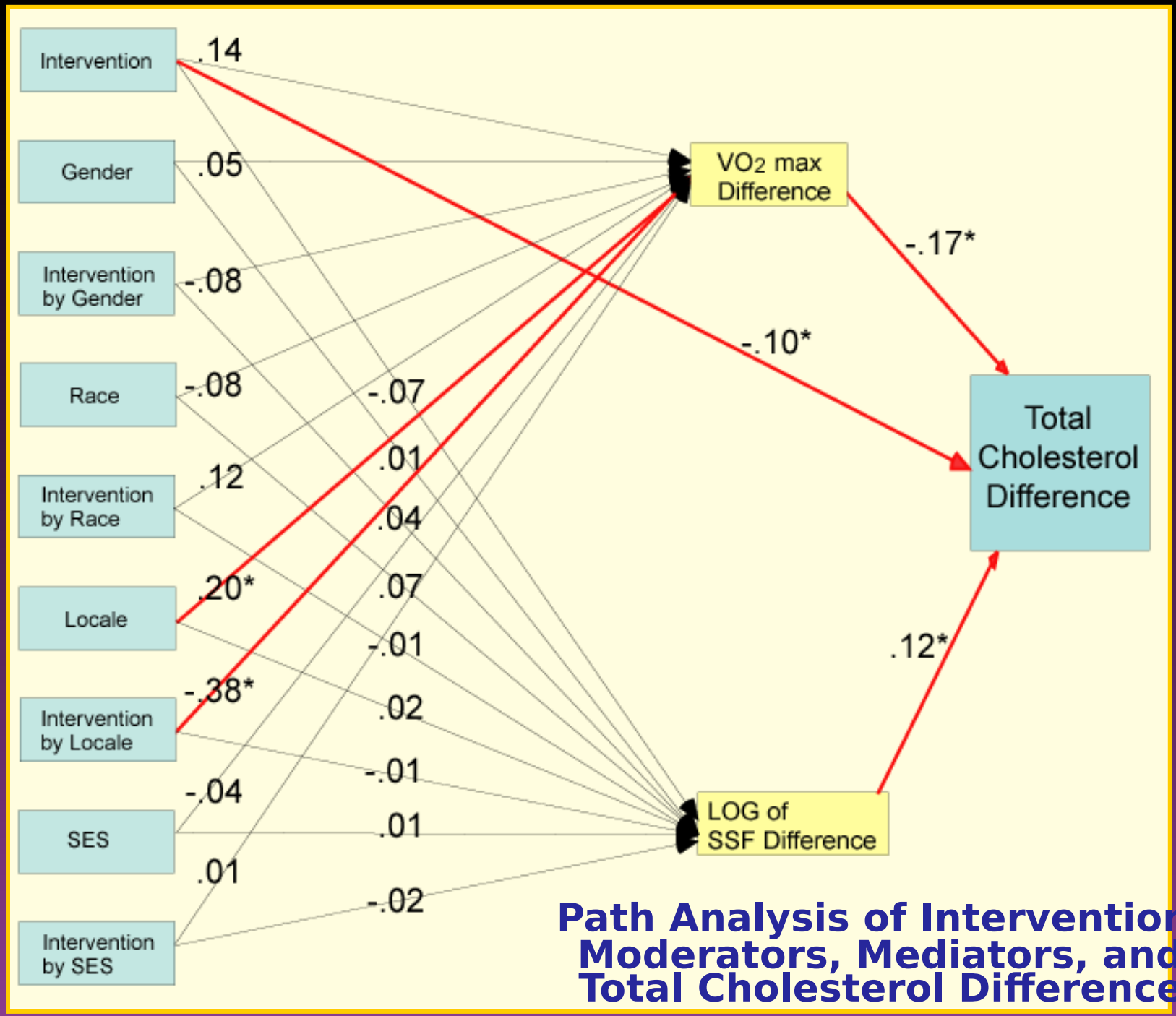
- Dependent Variable of Total Cholesterol
  - Fingerstick measurement
  - Non-fasting blood
  - Analysis was done with the Reflotron®
  - Internal and External QC measures

Data Analysis

- Both Mediating Variables & DV of TC were measured as change scores.
- Difference scores over time
  - Difference between two scores representing change
  - Created by subtracting the baseline score from the one-year score
- Represent the loss or gain in a variable's measurement between different time points.
- Loss = negative Gain = Positive

Data Analysis

- Path Analysis using Analysis of Moment Structures (AMOS) software
- Structural Equation Modeling with only observed variables
- Test a model with both mediating and moderating relationships
- To examine direct and indirect effects of the intervention on the DV

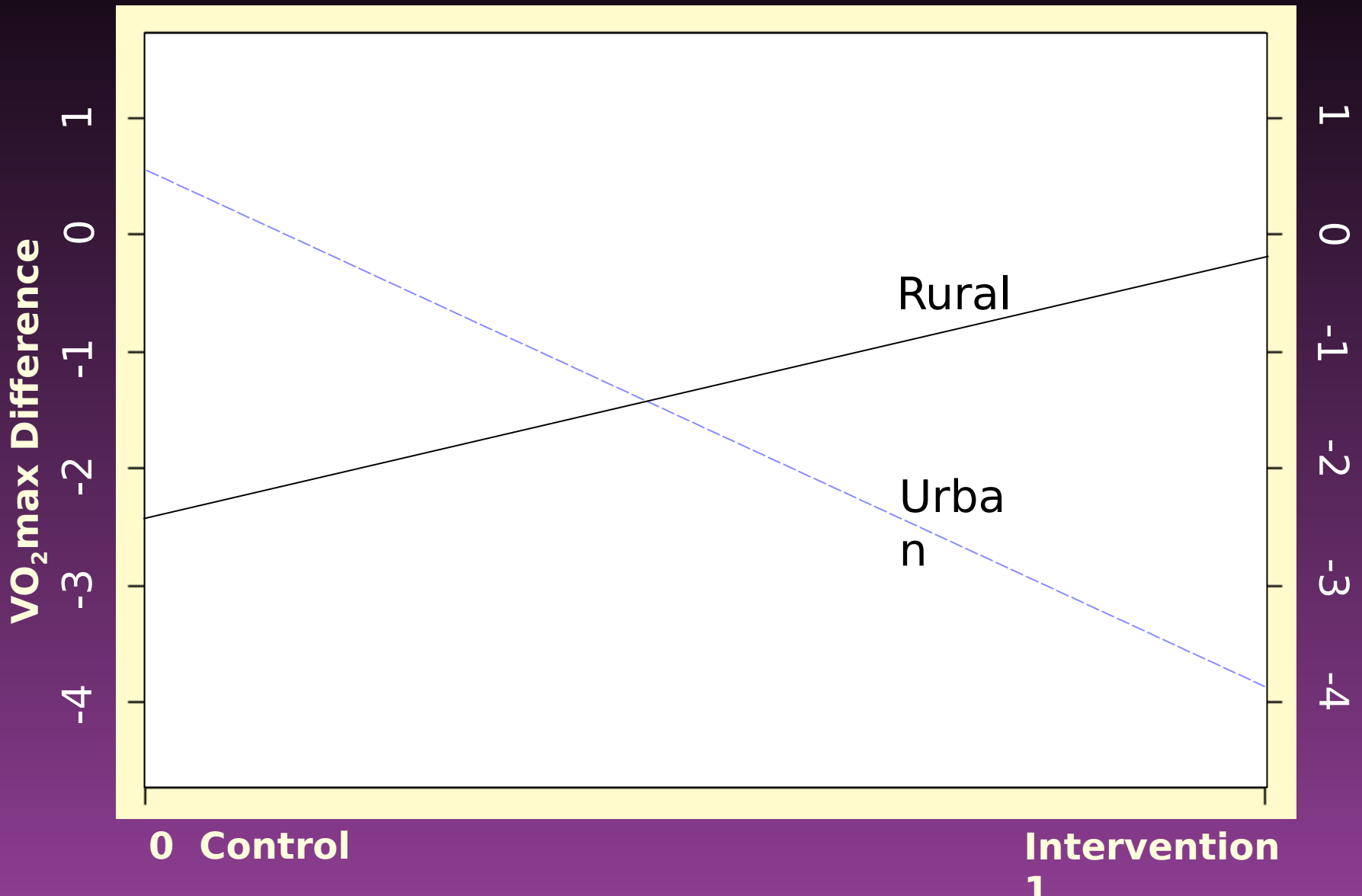


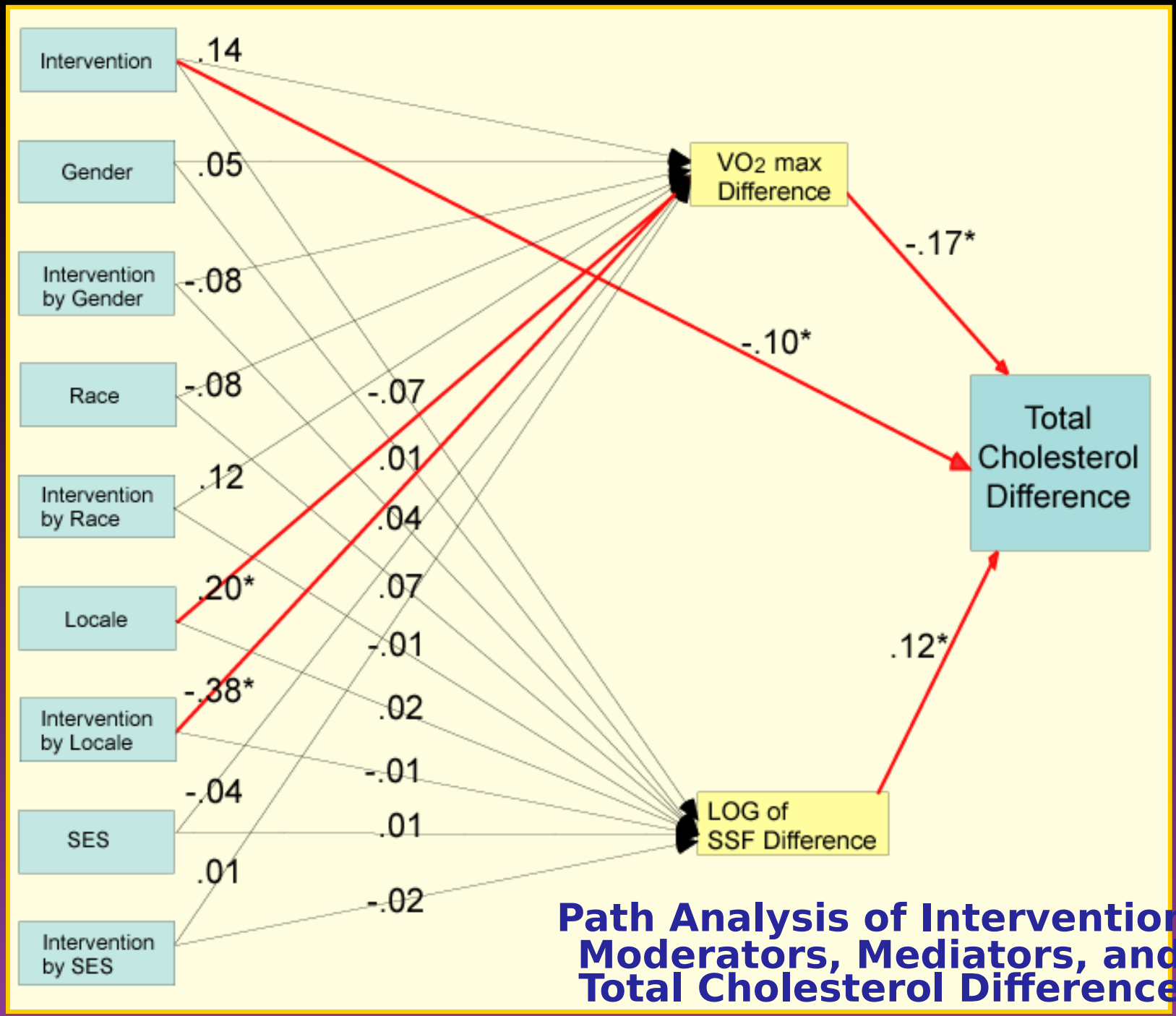
Path Analysis of Intervention, Moderators, Mediators, and Total Cholesterol Difference

Moderator Analysis

- Significant for Geographic Location
  - When the intervention effect is considered in interaction with the variable, the difference between rural and urban students is .38 (standardized units) more for rural students than for urban students
  - $P < 0.0001$

Regression of VO_2max Difference on Intervention by Locale



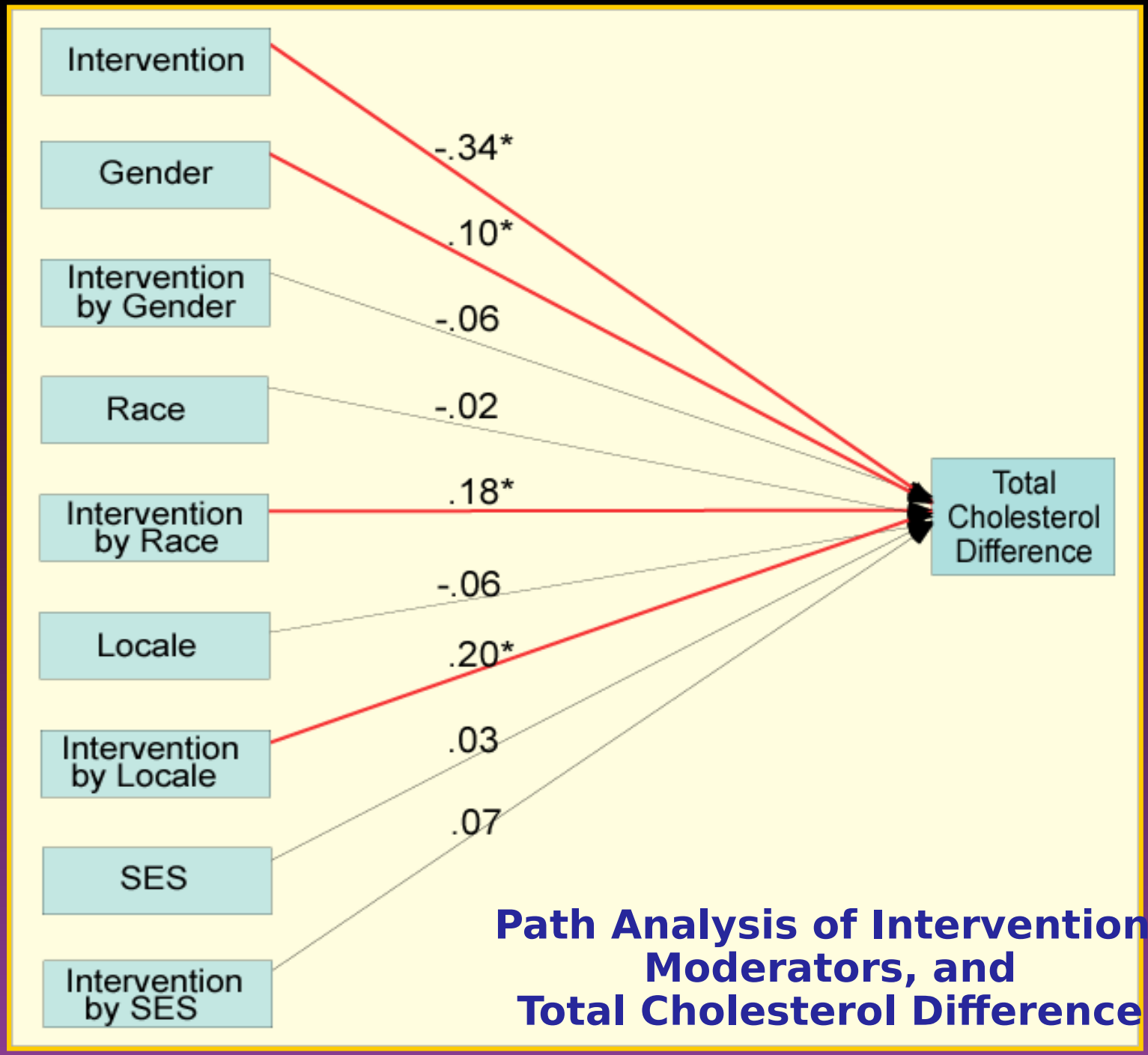


Path Analysis of Intervention, Moderators, Mediators, and Total Cholesterol Difference

Additional Analysis

Exploratory Question

Do Gender, Race, SES, and Geographic Location alone and/or in interaction with the Intervention function as Moderators in explaining intervention effects on the outcome variable of TC *without the mediating variables of fitness and obesity*?

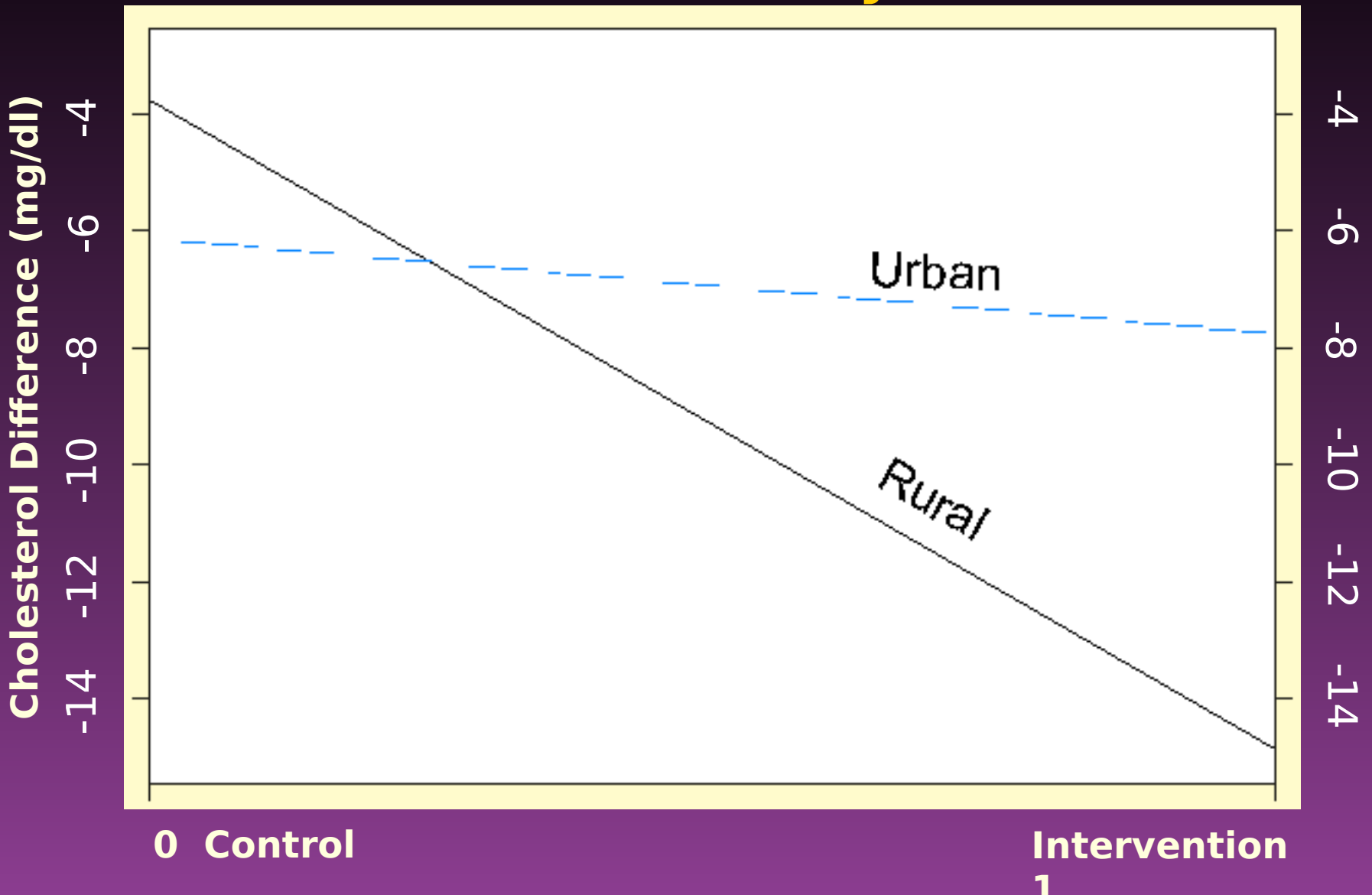


Path Analysis of Intervention, Moderators, and Total Cholesterol Difference

Moderator Analysis (1 of 2)

- Significant for Geographic Location
  - When the intervention effect is considered in interaction with the variable, the difference between rural and urban students is .20 (standardized units) more for rural students than for urban students
  - P = 0.0003

Regression of Cholesterol Difference on Intervention by Locale



Discussion of Moderator Significance

- Geographic Location of Rural and Urban
- Rural students who received the intervention improved their cardiorespiratory fitness AND total cholesterol more than urban students
- One year after the intervention

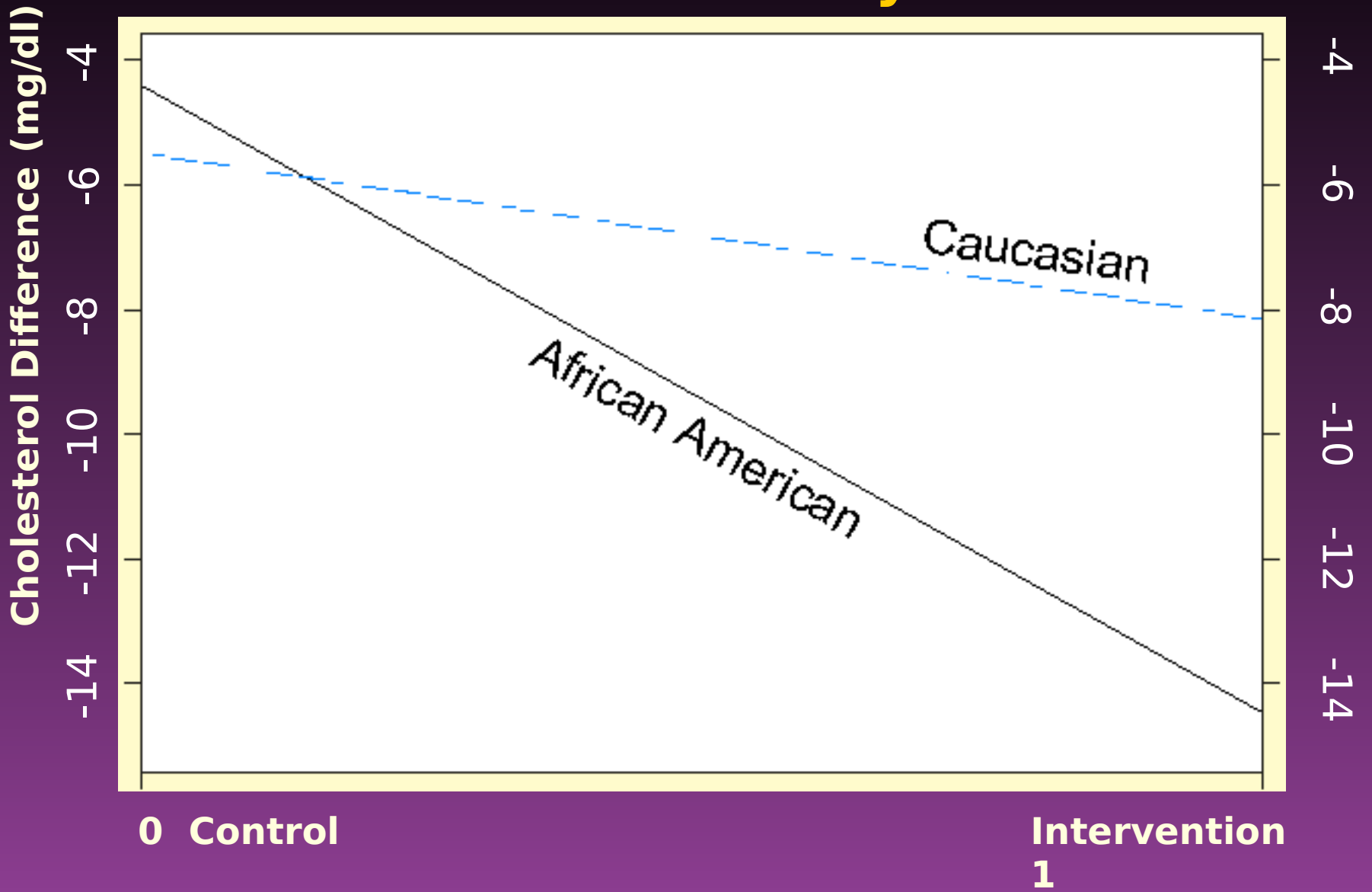
Moderator Analysis (2 of 2)

- Significant for Race
- When the intervention effect is considered in interaction with the variable, the difference between

  African American and Caucasian students is 0.18 (standardized units) more for African American students than for Caucasian students who received the intervention

  - p = 0.0180

Regression of Cholesterol Difference on Intervention by Race



Discussion of Moderator Significance

- Disparities between African American and Caucasians in terms of:
  - Preventive Health Practic
  - CVD & Risk Factors
    - Obesity
    - Diabetes

Discussion of Moderator Significance

- Significant for Reducing Disparities in Vulnerable Populations
- Disparities between rural/urban communities in terms of:
  - $
  - Cultures
  - Physical & social environments
  - Barriers

Implications

- Goal of improving CVD risk factors
- Significant influence in 2 subgroups
- School-based intervention
  - No specialized training required
  - No special resources needed
  - Easily Accessible
  - Easily Implemented
  - Easily Sustainable
  - Effective!!

Significance

Physical Activity

Significance

Knowledge Component

??

Graphic Assistance by
the Center for Instructional Technology
and Educational Support

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